

## **Gyrochronology of Stars in Wide Binaries in the Kepler K2 Fields**

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We propose to obtain time-series photometry of ~400 wide main-sequence binary stars with Kepler on Two Wheels (K2) and determine their rotation periods. This will allow for calibrating the rotation-age relationship for main-sequence stars older than ~1 Gyr for the first time. Such rotation-based ages are precise to ~10%, which exceeds any other current method of determining ages of stars in the Galactic field. We will expand on our ongoing work to characterize and quantify the limitations of both Kepler and K2 data.

Based on the underlying premise that stars are born with an initial distribution of rotation periods and slow down over time as they shed angular momentum, Barnes et al. have suggested an empirical framework for measuring stellar ages from their rotation periods. This paradigm, gyrochronology, works well for solar-type stars in young clusters and, apart from asteroseismology, is the most precise way to measure stellar ages of individual stars. Binary (or multiple) star systems are essentially small open clusters, albeit with just two members. While not able to provide the statistical power of the dozens of stars typical in an open cluster, an ensemble of binary systems in the Galactic field can be even more powerful as they span a range of ages, metallicities, and evolutionary histories that provide a truly heterogeneous population. Past the age of <1 Gyr, binaries are also much closer and brighter than open clusters. As all but the most massive open clusters, which are further away and fainter, become unbound after <1 Gyr, their utility is limited as lower-MS dwarfs tend to escape first, limiting their availability as age benchmarks. Lastly, components of wide binaries with semi-major axes  $\leq 500$  AU are coeval and evolve independently with no discernible effect on each other. Therefore, to test and calibrate gyrochronology for older stars, binary and multiple systems represent powerful keystones.